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EXAMINER	
YAM, STEPHEN K	
ART UNIT	**PAPER NUMBER**
2878	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/684,471	**Applicant(s)** BOCK, NIKOLAI E.	
	Examiner Stephen Yam	**Art Unit** 2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _29 August 2005_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-29_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-12,14,16-25,27 and 29_ is/are rejected.

7)☒ Claim(s) _13,15,26 and 28_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _15 October 2003_ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _0104_.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I in the reply filed on August 29, 2005 is acknowledged. The traversal is on the ground(s) that Applicant asserts that the total number of claims, while more than average, would not appear to pose any serious burden. This is not found persuasive because Examiner asserts that the different groups are patentably distinct and contain different claimed subject matter, each of which would require a separate, comprehensive search.

The requirement is still deemed proper and is therefore made FINAL.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, a pixel containing more than two photosensors (as recited in Claim 17) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 370, 372 (Fig. 3). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 19, 21, 24, 25, 27, and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Bamji et al. US Patent No. 6,919,549.

Regarding Claim 19, Bamji et al. teach (see Fig. 5A) a differential pixel for an imager device (see Fig. 11), said pixel comprising a plurality of photosensors (D_A, D_B), a plurality of storage nodes (C_A/S_A, C_B/S_B), each node being coupled to and storing charge from a respective one of said plurality of photosensors (see Col. 4, lines 59-64 and Col. 9, lines 57-65), and a differential amplifier (170) connected to said storage nodes and outputting a plurality of differential signals for each photosensor (since the differential amplifier is in constant operation (see Col. 10, lines 1-3), it outputs both integration and reset differential signals).

Regarding Claim 21, Bamji et al. teach the amplifier coupled to a plurality of output lines (positive and negative output of (170) to IS1, IS2, respectively, and IS1, IS2 to Vr/Cr).

Regarding Claim 24, Bamji et al. teach a plurality of reset transistors (Treset), each reset transistor being coupled between a reset voltage source (Vref) and a respective storage node (see Fig. 5A), said reset transistors being activated by a shared reset control signal (ϕ reset) such that each reset transistor is activated at a same time (see Fig. 5A).

Regarding Claim 25, Bamji et al. teach said differential amplifier outputs a first differential signal on a first output line (positive output of (170)), said first differential signal comprising a difference between a plurality of reset voltage signals input from said storage nodes (when the pixel is in reset, since the differential amplifier is in constant operation (see Col. 10, lines 1-3)).

Regarding Claim 27, Bamji et al. teach said differential amplifier outputs a second differential signal on a second output line (negative output of (170)), said second differential signal comprising a difference between a plurality of reset voltage signals input from said storage nodes (when the pixel is in reset, since the differential amplifier is in constant operation (see Col. 10, lines 1-3)).

Regarding Claim 29, Bamji et al. teach said plurality of differential signals comprises a plurality of differential reset signals (from both positive and negative outputs of (170) during reset period) and a plurality of differential pixel signals (from both positive and negative outputs of (170) during integration period).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-5, 10-12, 14, 16-18, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bamji et al.

Regarding Claim 1, Bamji et al. teach (see Fig. 5A) a differential pixel for an imager device, said pixel comprising a plurality of photosensors (D_A, D_B), a plurality of storage nodes (C_A/S_A, C_B/S_B), and a differential amplifier (170) connected to said storage nodes and outputting a plurality of differential signals for each photosensor (since the differential amplifier is in constant operation (see Col. 10, lines 1-3), it outputs both integration and reset differential signals). Bamji et al. do not teach a plurality of transfer transistors, each transfer transistor connected to and transferring charge from a respective photosensor, with each node being coupled to a respective transfer transistor and storing charge transferred by a respective one of said plurality of photosensors. However, Bamji et al. teaches (see Fig. 6A) another embodiment with a plurality of transfer transistors (TdisA, TdisB), each transfer transistor connected to and transferring charge from a respective photosensor (see Fig. 6A and Col. 11, lines 21-24, 49-50), with each node being coupled to a respective transfer transistor and storing charge (using C_A, C_B) transferred by a respective one of said plurality of photosensors (see Fig. 6A). it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a plurality of transfer transistors, each transfer transistor connected to and transferring charge from a respective photosensor, with each node being coupled to a respective transfer transistor and storing charge transferred by a respective one of said plurality of photosensors, as taught by Fig. 6A of Bamji et al., in the Fig. 5A pixel of Bamji et al., to provide output control of each photosensor to enable improved management of the charging process of the capacitors.

Regarding Claims 2 and 20, Bamji et al. teach the pixel in Claims 1 and 19, according to the appropriate paragraph above. Bamji et al. also teach a row select transistor (coupled to ϕ sample) connected along a current source (Is1) and said differential amplifier, said row select transistor causing said current source to be connected to an output (Vr/Cr) when activated. Bamji et al. do not teach the row select transistor connected *between* the current source and the differential amplifier, with the row select transistor causing the current source to be connected to *said amplifier* when activated. It is well known in the art to place a switch (select transistor) at any location along an output signal line, depending on the desired signal cutoff point. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the row select transistor connected *between* the current source and the differential amplifier, with the row select transistor causing the current source to be connected to *said amplifier* when activated, in the pixel of Bamji et al., to provide improved control of the voltage controlled current source, and to reduce consumed power when the pixel is not selected.

Regarding Claim 3, Bamji et al. teach the device in Claim 2, according to the appropriate paragraph above. Bamji et al. do not teach the current source as a tail current source. It is well known in the art to use a tail current source in conjunction with a differential amplifier within an imaging system. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the current source as a tail current source in the device of Bamji et al., to select optimal components for improving the performance of the system and output signal.

Regarding Claim 4, Bamji et al. teach the amplifier coupled to a plurality of output lines (positive and negative output of (170) to IS1, IS2, respectively, and IS1, IS2 to Vr/Cr).

Regarding Claims 5 and 22, Bamji et al. teach the pixel in Claims 4 and 21, according to the appropriate paragraph above. Bamji et al. do not teach the output lines electrically coupled to respective loads. It is well known in the art to place a load on an output line for a pixel, to enhance the output signal propagation. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the output lines electrically coupled to respective loads in the pixel of Bamji et al., to enhance the signal output by improving the propagation properties of the output line.

Regarding Claim 10, although Bamji et al. do not specifically teach activating the transfer transistors in sequence with charges transferred in a sequential manner, such a limitation is directed towards a specific method of operating the device and does not provide any additional structural limitations- since the claim is recited as a device claim, a specific method of operating the device cannot be given patentable weight.

Regarding Claim 11, Bamji et al. teach a plurality of reset transistors (Treset), each reset transistor being coupled between a reset voltage source (Vref) and a respective storage node (see Fig. 5A), said reset transistors being activated by a shared reset control signal (ϕ reset) such that each reset transistor is activated at a same time (see Fig. 5A).

Regarding Claim 12, Bamji et al. teach said differential amplifier outputs a first differential signal on a first output line (positive output of (170)), said first differential signal comprising a difference between a plurality of reset voltage signals input from said storage nodes (when the pixel is in reset, since the differential amplifier is in constant operation (see Col. 10, lines 1-3)).

Regarding Claim 14, Bamji et al. teach said differential amplifier outputs a second differential signal on a second output line (negative output of (170)), said second differential signal comprising a difference between a plurality of reset voltage signals input from said storage nodes (when the pixel is in reset, since the differential amplifier is in constant operation (see Col. 10, lines 1-3)).

Regarding Claim 16, Bamji et al. teach a number of photosensors is two (see Fig. 5A).

Regarding Claim 17, Bamji et al. teach the pixel in Claim 1, according to the appropriate paragraph above. Bamji et al. do not teach a number of photosensors as more than two. It is well known in the art to provide additional elements within a component, for improved accuracy, resolution, and/or redundancy. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide more than two photosensors in the pixel of Bamji et al., to improve the resolution for the imaging system and/or provide additional noise measurement.

Regarding Claim 18, Bamji et al. teach said plurality of differential signals comprises a plurality of differential reset signals (from both positive and negative outputs of (170) during reset period) and a plurality of differential pixel signals (from both positive and negative outputs of (170) during integration period).

8. Claims 6-9 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bamji et al. in view of Tamagawa US Patent No. 6,452,151.

Regarding Claims 6 and 23, Bamji et al. teach the pixel in Claims 1 and 19, according to the appropriate paragraph above. Bamji et al. do not teach the differential amplifier comprising two source follower transistors, each source follower transistor having a gate terminal connected to a respective storage node, a first source/drain terminal connected to an output line and a second source/drain terminal connected to a second node. Tamagawa teaches (see Fig. 2) a similar imaging device with a differential amplifier (T_1, T_2, 8, 9, 10) having two source follower transistors (T_1, T_2), each source follower transistor having a gate terminal connected to a respective storage photodiode node (outputs of A_0 and A_1), a first source/drain terminal (from T_1

to (8) and from T_2 to (9)) connected to an output line and a second source/drain terminal connected to a second node (reference voltage). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the differential amplifier comprising two source follower transistors, each source follower transistor having a gate terminal connected to a respective storage node, a first source/drain terminal connected to an output line and a second source/drain terminal connected to a second node, as taught by Tamagawa, in the pixel of Bamji et al., to stabilize the signal at each storage node prior to a differential operation.

Regarding Claim 7, Bamji et al. in view of Tamagawa teach the pixel in Claim 6, according to the appropriate paragraph above. Bamji et al. also teach a row select transistor (coupled to ϕ sample) connected along a current source (Is1) and said differential amplifier, said row select transistor causing said current source to be connected to an output (Vr/Cr) when activated. Bamji et al. do not teach the row select transistor connected *between* the current source and the differential amplifier, with the row select transistor causing the current source to be connected to *said amplifier* when activated. It is well known in the art to place a switch (select transistor) at any location along an output signal line, depending on the desired signal cutoff point. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the row select transistor connected *between* the current source and the differential amplifier, with the row select transistor causing the current source to be connected to *said amplifier* when activated, in the pixel of Bamji et al. in view of Tamagawa, to provide improved control of the voltage controlled current source, and to reduce consumed power when the pixel is not selected.

Regarding Claim 8, Bamji et al. in view of Tamagawa teach the device in Claim 7, according to the appropriate paragraph above. Bamji et al. do not teach the current source as a tail current source. It is well known in the art to use a tail current source in conjunction with a differential amplifier within an imaging system. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the current source as a tail current source in the device of Bamji et al. in view of Tamagawa, to select optimal components for improving the performance of the system and output signal.

Regarding Claim 9, Bamji et al. teach a plurality of reset transistors (Treset), each reset transistor being coupled between a reset voltage source (Vref) and a respective storage node (see Fig. 5A), said reset transistors being activated by a shared reset control signal (ϕ reset) such that each reset transistor is activated at a same time (see Fig. 5A).

Allowable Subject Matter

9. Claims 13, 15, 26, and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

The invention as claimed, specifically in combination with the differential amplifier outputting a differential signal comprising a difference between a pixel voltage signal input from a first storage node and a reset voltage signal input from a second storage node, with each storage node storing charge transferred by a respective one of a plurality of photosensors, is not disclosed or made obvious by the prior art of record.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kim et al. US Patent No. 6,731,335 and Nair US Patent No. 6,646,245, teach imaging devices with pixels having multiple photo-sensors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Yam whose telephone number is (571)272-2449. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on (571)272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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THANH X. LUU
PATENT EXAMINER